

WHAT IS CLAIMED IS:

1. A composite polyamide reverse osmosis membrane comprising:
- (a) a microporous support;
 - (b) a polyamide layer on said microporous support; and
 - (c) a hydrophilic coating on said polyamide layer, said hydrophilic coating being made by (i) applying to the polyamide layer a quantity of a polyfunctional epoxy compound, said polyfunctional epoxy compound comprising at least two epoxy groups, and (ii) then, cross-linking the polyfunctional epoxy compound in such a manner as to yield a water-insoluble polymer.
2. The composite polyamide reverse osmosis membrane as claimed in claim 1 wherein said microporous support is made of a material selected from the group consisting of a polysulfone, a polyether sulfone, a polyimide, a polyamide, a polyetherimide, polyacrylonitrile, poly(methyl methacrylate), polyethylene, polypropylene and a halogenated polymer.
3. The composite polyamide reverse osmosis membrane as claimed in claim 1 wherein said polyamide layer is the interfacial reaction product of a polyfunctional amine and a polyfunctional amine-reactive reactant.
4. The composite polyamide reverse osmosis membrane as claimed in claim 3 wherein said polyfunctional amine is at least one member selected from the group consisting of an aromatic primary diamine and substituted derivatives thereof, an alkane primary diamine, a cycloaliphatic primary diamine, a cycloaliphatic secondary diamine, an aromatic secondary diamine and a xylylene diamine.
5. The composite polyamide reverse osmosis membrane as claimed in claim 4 wherein said polyfunctional amine is meta-phenylenediamine.

6. The composite polyamide reverse osmosis membrane as claimed in claim 4 wherein said polyfunctional amine is piperazine.

7. The composite polyamide reverse osmosis membrane as claimed in claim 3 wherein said polyfunctional amine-reactive reactant is at least one member selected from the group consisting of a polyfunctional acyl halide, a polyfunctional sulfonyl halide and a polyfunctional isocyanate.

8. The composite polyamide reverse osmosis membrane as claimed in claim 7 wherein said polyfunctional amine-reactive reactant is trimesoyl chloride.

9. The composite polyamide reverse osmosis membrane as claimed in claim 1 wherein said polyfunctional epoxy compound comprises at least three epoxy groups.

10. The composite polyamide reverse osmosis membrane as claimed in claim 9 wherein said polyfunctional epoxy compound is at least one member selected from the group consisting of glycerol triglycidyl ether; diglycerol triglycidyl ether; pentaerythritol triglycidyl ether; sorbitol triglycidyl ether; glycerol propoxylate triglycidyl ether; trimethylolpropane triglycidyl ether; 1,1,1-tris(hydroxymethyl)ethane triglycidyl ether; 1,1,1-tris(hydroxyphenyl)ethane triglycidyl ether; tris(hydroxymethyl)nitromethane triglycidyl ether; tris(2,3-epoxypropyl)isocyanurate; phloroglucinol triglycidyl ether; N,N-diglycidyl-4-glycidyl oxyaniline; a reaction product of epichlorohydrin and 1,3,5,-tris(2-hydroxyethyl)cyanuric acid; a reaction product of epichlorohydrin and tris(hydroxymethyl)amino methane; sorbitol tetraglycidyl ether; pentaerythritol tetraglycidyl ether; polyglycerol tetraglycidyl ether; and 4,4'-methylenebis(N,N-diglycidylaniline); sorbitol pentaglycidyl ether; sorbitol hexaglycidyl ether; polyglycerol polyglycidyl ether; epoxy cresol novolac resin; a reaction product of polyvinyl alcohol and epichlorohydrin; a reaction product of polyvinyl phenol and epichlorohydrin; a reaction product of polyacrylamide and epichlorohydrin; a reaction product

of epichlorohydrin and cellulose; and a reaction product of epichlorohydrin and a cellulose derivative.

11. The composite polyamide reverse osmosis membrane as claimed in claim 9 wherein said polyfunctional epoxy compound is cross-linked through self-polymerization.

12. The composite polyamide reverse osmosis membrane as claimed in claim 9 wherein said polyfunctional epoxy compound is cross-linked with the help of a cross-linking compound.

13. The composite polyamide reverse osmosis membrane as claimed in claim 12 wherein said cross-linking compound comprises at least two epoxy-reactive groups selected from the group consisting of hydroxy groups; amino groups; carboxyl groups; carboxylic acid anhydride groups; amide groups; carbonyl groups; and sulfurhydryl (thiol) groups.

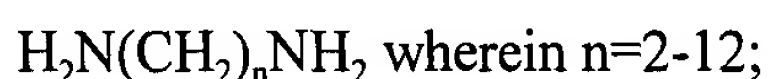
14. The composite polyamide reverse osmosis membrane as claimed in claim 13 wherein said at least two epoxy-reactive groups are the same.

15. The composite polyamide reverse osmosis membrane as claimed in claim 13 wherein said at least two epoxy-reactive groups are different.

16. The composite polyamide reverse osmosis membrane as claimed in claim 13 wherein said cross-linking compound is at least one member selected from the group consisting of ethylene glycol; propylene glycol; 1,3-propanediol; 1,3-butanediol; 1,4-butanediol; 1,5-pentanediol; 1,2-pentanediol; 2,4-pentanediol; 1,6-hexanediol; 1,2-hexanediol; 1,5-hexanediol; 2,5-hexanediol; 2-ethyl-1,3-hexanediol; 1,7-heptanediol; 1,2-octanediol; 1,8-octanediol; 1,9-nonanediol; 1,10-decanediol; 1,2-decanediol; 1,12-dodecanediol; 1,2-dodecanediol; glycerol; trimethylolpropane; 1,1,1-tris(hydroxymethyl)ethane; 1,1,1-tris(hydroxyphenyl)ethane; tris(hydroxymethyl)aminomethane; tris(hydroxymethyl)nitromethane; 1,3,5-tris(2-

hydroxyethyl)cyanuric acid; pentaerythritol; sorbitol; glucose; fructose; maltose; mannose; glucosamine; mannosamine; a polysaccharide; neopentyl glycol; dibromoneopentyl glycol; hydroquinone, resorcinol; bisphenol A; hydrogenated bisphenol A; isocyanuric acid; phloroglucinol; methylenebis(aniline); novolac resin; polyvinyl alcohol; polyvinyl phenol; polyacrylamide; cellulose; ethylcellulose; methyl cellulose; hydroxypropyl cellulose; hydroxyethyl cellulose; polyethylene glycol with the repeating ethylene glycol unit $(\text{CH}_2\text{CH}_2\text{O})_n$ wherein n ranges from 2 to 400, inclusive; and polypropylene glycol with the repeating ethylene glycol unit $((\text{CH}_3)\text{CH}_2\text{CH}_2\text{O})_n$ wherein n ranges from 2 to 100, inclusive.

17. The composite polyamide reverse osmosis membrane as claimed in claim 13 wherein said cross-linking compound is at least one member selected from the group consisting of alkanediamines and their alkyl or aryl derivatives on nitrogens and backbone carbons of the types shown below:



$\text{R}_1\text{R}_2\text{N}(\text{CH}_2)_n\text{NR}_3\text{R}_4$ wherein $n=2-12$ and R_1 , R_2 , R_3 and R_4 are the same or different and are selected from the group consisting of hydrogen, methyl, ethyl, propyl, butyl, cyclohexyl and phenyl;

$\text{H}_2\text{N}(\text{CH}_2)_n\text{NH}_2$ and $\text{R}_1\text{R}_2\text{N}(\text{CH}_2)_n\text{NR}_3\text{R}_4$ wherein $n=2-12$ and R_1 , R_2 , R_3 , R_4 and R_5 are the same or different and are selected from the group consisting of hydrogen, methyl, ethyl, propyl, butyl, cyclohexyl, hydroxyl and phenyl;

Alicyclic diamines selected from the group consisting of diaminocyclohexane; 1,3-cyclohexanebis(methylamine); 4,4'-trimethylenedipiperidine; piperazine; 1,4-dimethylpiperazine;

1,4-diazabicyclo[2.2.2]octane; 1,8-diazabicyclo[5.4.0]undec-7-ene; 1,5-diazabicyclo[4.3.0]non-5-ene; and

Aromatic diamines selected from the group consisting of meta-phenylenediamine; meta-xylylenediamine; and bis(4-aminophenyl)sulfone.

18. The composite polyamide reverse osmosis membrane as claimed in claim 13 wherein said cross-linking compound is at least one member selected from the group consisting of N,N'-bis(2-aminoethyl)-1,3-propanediamine, diethylenetriamine, triethylenetetramine; tris(2-aminoethyl)amine; N,N,N',N',N''-pentamethyldiethylenetriamine; triaminobenzene; 1,1,3,3-tetramethylguanidine; polyethylenimine; chitosan; poly(allylamine); and polyvinylpyridine.

19. The composite polyamide reverse osmosis membrane as claimed in claim 13 wherein said cross-linking compound is at least one member selected from the group consisting of tartaric acid; gluconic acid; glucuronic acid; 3,5-dihydroxybenzoic acid; 2,5-dihydroxybenzenesulfonic acid potassium salt; and 2,5-dihydroxy-1,4-benzenedisulfonic acid dipotassium salt.

20. The composite polyamide reverse osmosis membrane as claimed in claim 13 wherein said cross-linking compound is at least one member selected from the group consisting of 3,5-diaminobenzoic acid; 2-aminoethanesulfonic acid (taurine); 2-[[tris(hydroxymethyl)methyl]amino]-1-ethanesulfonic acid; 3-[[tris(hydroxymethyl)methyl]amino]-1-propanesulfonic acid; 2-hydroxy-3-[[tris(hydroxymethyl)methyl]amino]-1-propanesulfonic acid; β -hydroxy-4-(2-hydroxyethyl)-1-piperazinepropanesulfonic acid; β,β' -dihydroxy-1,4-piperazinebis(propanesulfonic acid); and 2,5-diaminobenzenesulfonic acid.

21. The composite polyamide reverse osmosis membrane as claimed in claim 1 wherein said polyfunctional epoxy compound comprises exactly two epoxy groups.

22. The composite polyamide reverse osmosis membrane as claimed in claim 21 wherein said polyfunctional epoxy compound is at least one member selected from the group consisting of ethyleneglycol diglycidyl ether; propylene glycol diglycidyl ether; 1,3-propanediol diglycidyl ether; 1,3-butanediol diglycidyl ether; 1,4-butanediol diglycidyl ether; 1,5-pentanediol diglycidyl ether; 1,2-pentanediol diglycidyl ether; 2,4-pentanediol diglycidyl ether; 1,6-hexanediol diglycidyl ether; 1,2-hexanediol diglycidyl ether; 1,5-hexanediol diglycidyl ether; 2,5-hexanediol diglycidyl ether; 2-ethyl-1,3-hexanediol diglycidyl ether; 1,7-heptanediol diglycidyl ether; 1,2-octanediol diglycidyl ether; 1,8-octanediol diglycidyl ether; 1,9-nonanediol diglycidyl ether; 1,10-decanediol diglycidyl ether; 1,2-decanediol diglycidyl ether; 1,12-dodecanediol diglycidyl ether; 1,2-dodecanediol diglycidyl ether; glycerol diglycidyl ether; trimethylolpropane diglycidyl ether; 1,1,1-tris(hydroxymethyl)ethane diglycidyl ether; pentaerythritol diglycidyl ether; sorbitol diglycidyl ether; neopentyl glycol diglycidyl ether; dibromoneopentyl glycol diglycidyl ether; hydroquinone diglycidyl ether; resorcinol diglycidyl ether; bisphenol A diglycidyl ether; hydrogenated bisphenol A diglycidyl ether; polyethylene glycol diglycidyl ether with the repeating ethylene glycol unit $(\text{CH}_2\text{CH}_2\text{O})_n$ wherein n is an integer ranging from 2 to 400, inclusive; and polypropylene glycol diglycidyl ether with the repeating propylene glycol unit $((\text{CH}_3)\text{CH}_2\text{CH}_2\text{O})_n$ wherein n is an integer ranging from 2 to 100, inclusive.

23. The composite polyamide reverse osmosis membrane as claimed in claim 21 wherein said polyfunctional epoxy compound is cross-linked using a cross-linking compound, said cross-linking compound having at least three epoxy-reactive groups.

24. The composite polyamide reverse osmosis membrane as claimed in claim 23 wherein said at least three epoxy-reactive groups of said cross-linking compound are selected from the group

consisting of hydroxy groups; amino groups; carboxyl groups; carboxylic acid anhydride groups; amide groups; carbonyl groups; and sulfurhydryl (thiol) groups.

25. The composite polyamide reverse osmosis membrane as claimed in claim 24 wherein said at least three epoxy-reactive groups are the same.

26. The composite polyamide reverse osmosis membrane as claimed in claim 24 wherein at least two of said at least three epoxy-reactive groups are different.

27. The composite polyamide reverse osmosis membrane as claimed in claim 23 wherein said cross-linking compound is at least one member selected from the group consisting of N,N'-bis(2-aminoethyl)-1,3-propanediamine, diethylenetriamine, triethylenetetramine; tris(2-aminoethyl)amine; N,N,N',N',N''-pentamethyldiethylenetriamine; triaminobenzene; 1,1,3,3-tetramethylguanidine; polyethylenimine; chitosan; poly(allylamine); and polyvinylpyridine.

28. The composite polyamide reverse osmosis membrane as claimed in claim 23 wherein said cross-linking compound is at least one member selected from the group consisting of tartaric acid; gluconic acid; glucuronic acid; 3,5-dihydroxybenzoic acid; 2,5-dihydroxybenzenesulfonic acid potassium salt; and 2,5-dihydroxy-1,4-benzenedisulfonic acid dipotassium salt.

29. The composite polyamide reverse osmosis membrane as claimed in claim 23 wherein said cross-linking compound is at least one member selected from the group consisting of glycerol; trimethylolpropane; 1,1,1-tris(hydroxymethyl)ethane; 1,1,1-tris(hydroxyphenyl)ethane; tris(hydroxymethyl)aminomethane; tris(hydroxymethyl)nitromethane; 1,3,5-tris(2-hydroxyethyl)cyanuric acid; pentaerythritol; sorbitol; glucose; fructose; maltose; mannose; glucosamine; mannosamine; a polysaccharide; isocyanuric acid; phloroglucinol;

methylenedianiline; novolac resin; polyvinyl alcohol; polyvinyl phenol; polyacrylamide; and cellulose and its derivatives.

30. The composite polyamide reverse osmosis membrane as claimed in claim 21 wherein said polyfunctional epoxy compound is cross-linked using a cross-linking compound, said cross-linking compound being a diamino compound having two primary amino groups, two secondary amino groups, or one primary amino group and one secondary amino group.

31. A method of making a coated composite polyamide reverse osmosis membrane, said method comprising the steps:

(a) coating a porous support with an aqueous solution, said aqueous solution comprising a polyfunctional amine, so as to form a liquid layer on said porous support;

(b) contacting said liquid layer with an organic solvent solution, said organic solvent solution comprising an amine-reactive reactant selected from the group consisting of a polyfunctional acyl halide, a polyfunctional sulfonyl halide and a polyfunctional isocyanate, so as to interfacially condense said amine-reactive reactant with said polyfunctional amine, thereby forming a cross-linked, interfacial polyamide layer on said porous support; and

(c) drying the product of step (b) to form a composite polyamide reverse osmosis membrane;

(d) then, forming a hydrophilic coating on the cross-linked, interfacial polyamide layer of said composite polyamide reverse osmosis membrane by (i) applying to said cross-linked, interfacial polyamide film a quantity of a polyfunctional epoxy compound, said polyfunctional epoxy compound comprising at least two epoxy groups, and (ii) then, cross-linking the polyfunctional epoxy compound in such a manner as to yield a water-insoluble polymer.

32. The method as claimed in claim 31 further comprising, between steps (c) and (d), the steps of rinsing the product of step (c) in a basic aqueous solution and then rinsing the thus rinsed product with deionized water.

33. The method as claimed in claim 31 wherein said polyfunctional amine is meta-phenylenediamine.

34. The method as claimed in claim 31 wherein said polyfunctional amine is piperazine.

35. The method as claimed in claim 31 wherein said step of applying said polyfunctional epoxy compound to said cross-linked, interfacial polyamide film comprises forming said polyfunctional epoxy compound and then treating the cross-linked, interfacial polyamide film with said polyfunctional epoxy compound.

36. The method as claimed in claim 35 wherein said polyfunctional epoxy compound is applied to the cross-linked, interfacial polyamide film as part of a coating solution comprising (i) a solvent comprising at least one of water and an alcohol; and (ii) said polyfunctional epoxy compound in an amount ranging from about 0.00001 wt % to 20 wt % of the coating solution.

37. The method as claimed in claim 36 wherein said polyfunctional epoxy compound is present in said coating solution in an amount ranging from about 0.0001 wt % to 5 wt % of said coating solution.

38. The method as claimed in claim 31 wherein said step of applying said polyfunctional epoxy compound to said cross-linked, interfacial polyamide film comprises treating the cross-linked, interfacial polyamide film with reactants for making said polyfunctional epoxy compound and then forming said polyfunctional epoxy compound in situ on said cross-linked, interfacial polyamide film.

39 The method as claimed in claim 31 wherein said cross-linking of said polyfunctional epoxy compound is catalyzed by a catalyst selected from the group consisting of a base, an acid, and heat.

40. The method as claimed in claim 39 wherein said base is at least one member selected from the group consisting of an alkoxide salt; a hydroxide salt; a carbonate salt; a phosphate salt; a phenoxide salt; a borate salt; a carboxylate salt; ammonia; a primary amine; a secondary amine; and a tertiary amine.

41. The method as claimed in claim 39 wherein said acid is at least one member selected from the group consisting of an inorganic acid, an organic acid and a Lewis acid.

42. The method as claimed in claim 41 wherein said acid is at least one member selected from the group consisting of sulfuric acid; hydrochloric acid; nitric acid; an aromatic sulfonic acid; an aliphatic sulfonic acid; a cycloaliphatic sulfonic acid; a carboxylic acid; a fluorinated carboxylic acid; phenol and its derivatives; boric acid; tetrafluoroboric acid; aluminum trihalide; an aluminum trialkoxide; a boron trihalide; zinc tetrafluoroborate; a tin tetrahalide; a quaternary ammonium salt; and an acid salt of ammonia or a primary, secondary or tertiary amine.

43. The method as claimed in claim 39 wherein said heat comprises heating at about 10°C to 200°C for a time period of about 1 second to 7 days.

44. The method as claimed in claim 43 wherein said heat comprises heating at about 20°C to 150°C for a time period of about 5 seconds to 3 days.

45. The method as claimed in claim 31 wherein said cross-linking of said polyfunctional epoxy compound is catalyzed by heating at about 10°C to 150°C for a time period of about 1 second to 2 days in the presence of one of a base and an acid.

46. The method as claimed in claim 31 wherein said polyfunctional epoxy compound comprises at least three epoxy groups.

47. The method as claimed in claim 46 wherein said polyfunctional epoxy compound is at least one member selected from the group consisting of glycerol triglycidyl ether; diglycerol triglycidyl ether; pentaerythritol triglycidyl ether; sorbitol triglycidyl ether; glycerol propoxylate triglycidyl ether; trimethylolpropane triglycidyl ether; 1,1,1-tris(hydroxymethyl)ethane triglycidyl ether; 1,1,1-tris(hydroxyphenyl)ethane triglycidyl ether; tris(hydroxymethyl)nitromethane triglycidyl ether; tris(2,3-epoxypropyl)isocyanurate; phloroglucinol triglycidyl ether; N,N-diglycidyl-4-glycidyl oxyaniline; a reaction product of epichlorohydrin and 1,3,5,-tris(2-hydroxyethyl)cyanuric acid; a reaction product of epichlorohydrin and tris(hydroxymethyl)amino methane; sorbitol tetraglycidyl ether; pentaerythritol tetraglycidyl ether; polyglycerol tetraglycidyl ether; and 4,4'-methylenebis(N,N-diglycidylaniline); sorbitol pentaglycidyl ether; sorbitol hexaglycidyl ether; polyglycerol polyglycidyl ether; epoxy cresol novolac resin; a reaction product of polyvinyl alcohol and epichlorohydrin; a reaction product of polyvinyl phenol and epichlorohydrin; a reaction product of polyacrylamide and epichlorohydrin; a reaction product of epichlorohydrin and cellulose; and a reaction product of epichlorohydrin and a cellulose derivative.

48. The method as claimed in claim 46 wherein said polyfunctional epoxy compound is cross-linked through self-polymerization.

49. The method as claimed in claim 46 wherein said polyfunctional epoxy compound is cross-linked with the help of a cross-linking compound.

50. The method as claimed in claim 46 wherein said cross-linking compound comprises at least two epoxy-reactive groups selected from the group consisting of hydroxy groups; amino groups;

carboxyl groups; carboxylic acid anhydride groups; amide groups; carbonyl groups; and sulfurhydryl (thiol) groups.

51. The method as claimed in claim 31 wherein said polyfunctional epoxy compound comprises exactly two epoxy groups.

52. The method as claimed in claim 51 wherein said polyfunctional epoxy compound is at least one member selected from the group consisting of ethyleneglycol diglycidyl ether; propylene glycol diglycidyl ether; 1,3-propanediol diglycidyl ether; 1,3-butanediol diglycidyl ether; 1,4-butanediol diglycidyl ether; 1,5-pentanediol diglycidyl ether; 1,2-pentanediol diglycidyl ether; 2,4-pentanediol diglycidyl ether; 1,6-hexanediol diglycidyl ether; 1,2-hexanediol diglycidyl ether; 1,5-hexanediol diglycidyl ether; 2,5-hexanediol diglycidyl ether; 2-ethyl-1,3-hexanediol diglycidyl ether; 1,7-heptanediol diglycidyl ether; 1,2-octanediol diglycidyl ether; 1,8-octanediol diglycidyl ether; 1,9-nonanediol diglycidyl ether; 1,10-decanediol diglycidyl ether; 1,2-decanediol diglycidyl ether; 1,12-dodecanediol diglycidyl ether; 1,2-dodecanediol diglycidyl ether; glycerol diglycidyl ether; trimethylolpropane diglycidyl ether; 1,1,1-tris(hydroxymethyl)ethane diglycidyl ether; pentaerythritol diglycidyl ether; sorbitol diglycidyl ether; neopentyl glycol diglycidyl ether; dibromoneopentyl glycol diglycidyl ether; hydroquinone diglycidyl ether; resorcinol diglycidyl ether; bisphenol A diglycidyl ether; hydrogenated bisphenol A diglycidyl ether; polyethylene glycol diglycidyl ether with the repeating ethylene glycol unit $(\text{CH}_2\text{CH}_2\text{O})_n$ wherein n is an integer ranging from 2 to 400, inclusive; and polypropylene glycol diglycidyl ether with the repeating propylene glycol unit $((\text{CH}_3)\text{CH}_2\text{CH}_2\text{O})_n$ wherein n is an integer ranging from 2 to 100, inclusive.

53. The method as claimed in claim 51 wherein said polyfunctional epoxy compound is cross-linked using a cross-linking compound, said cross-linking compound having at least three epoxy-reactive groups.

54. The method as claimed in claim 53 wherein said at least three epoxy-reactive groups of said cross-linking compound are selected from the group consisting of hydroxy groups; amino groups; carboxyl groups; carboxylic acid anhydride groups; amide groups; carbonyl groups; and sulfurhydryl (thiol) groups.

55. The method as claimed in claim 51 wherein said polyfunctional epoxy compound is cross-linked using a cross-linking compound, said cross-linking compound being a diamino compound having two primary amino groups, two secondary amino groups, or one primary amino group and one secondary amino group.

56. The method as claimed in claim 49 wherein said polyfunctional epoxy compound and said cross-linking agent are applied to said cross-linked, interfacial polyamide film in a coating solution and wherein said cross-linking agent is present in said coating solution in an amount ranging from about 0.001 wt % of said polyfunctional epoxy compound to an amount equivalent to said polyfunctional epoxy compound.

57. The method as claimed in claim 55 wherein said cross-linking agent is present in said coating solution in an amount ranging from about 0.1 wt % of said polyfunctional epoxy compound to an amount equivalent to said polyfunctional epoxy compound.

58. A microporous membrane comprising:

(a) a microporous support; and

(b) a hydrophilic coating on said microporous support, said hydrophilic coating being made by (i) applying to the microporous support a quantity of a polyfunctional epoxy compound, said polyfunctional epoxy compound comprising at least two epoxy groups, and (ii) then, cross-linking the polyfunctional epoxy compound in such a manner as to yield a water-insoluble polymer.

59. The microporous support as claimed in claim 58 wherein said microporous support is made of a material selected from the group consisting of a polysulfone, a polyether sulfone, a polyimide, a polyamide, a polyetherimide, polyacrylonitrile, poly(methyl methacrylate), polyethylene, polypropylene and a halogenated polymer.

60. The microporous support as claimed in claim 58 wherein said microporous support is a microfiltration membrane.

61. The microporous support as claimed in claim 58 wherein said microporous support is an ultrafiltration membrane.

62. The microporous support as claimed in claim 58 wherein said polyfunctional epoxy compound comprises at least three epoxy groups.

63. The microporous support as claimed in claim 62 wherein said polyfunctional epoxy compound is cross-linked through self-polymerization.

64. The microporous support as claimed in claim 62 wherein said polyfunctional epoxy compound is cross-linked with the help of a cross-linking compound.

65. The microporous support as claimed in claim 58 wherein said polyfunctional epoxy compound comprises exactly two epoxy groups.

66. The microporous support as claimed in claim 65 wherein said polyfunctional epoxy compound is cross-linked using a cross-linking compound, said cross-linking compound having at least three epoxy-reactive groups.

67. The microporous support as claimed in claim 65 wherein said polyfunctional epoxy compound is cross-linked using a cross-linking compound, said cross-linking compound being a diamino compound having two primary amino groups, two secondary amino groups, or one primary amino group and one secondary amino group.

~~68.~~ A method of making a coated microporous membrane, said method comprising the steps:

(a) providing a microporous support; and

(b) then, forming a hydrophilic coating on the microporous support by (i) applying to said microporous support a quantity of a polyfunctional epoxy compound, said polyfunctional epoxy compound comprising at least two epoxy groups, and (ii) then, cross-linking the polyfunctional epoxy compound in such a manner as to yield a water-insoluble polymer.

69. The method as claimed in claim 68 wherein said microporous support is a microfiltration membrane.

70. The method as claimed in claim 68 wherein said microporous support is an ultrafiltration membrane.